In the Claims:

1. (Currently Amended) A method of measuring lateral variations of a property, selected from the group consisting of thickness and refractive index, of a transparent film, in a patterned area comprising repeated patterning, on a substrate, comprising the steps of:

(a) illuminating over the ~~film~~ patterned area with a beam of light of multiple wavelengths said beam having dimensions to include repeated patterning within an illumination area;

(b) detecting the intensity of the light reflected ~~from~~ over the ~~transparent film~~patterned area for each wavelength;

(c) producing a signal defining the variation of the intensity of the detected light as a function of the wavelength of the detected light;

(d) decomposing said signal into principal frequencies thereof; ~~and~~

(e) determining, from said principal frequencies, values of ~~the lateral variations of~~ the property of the transparent film as said property varies laterally over said repeated patterning and

(f) applying said values to repetitions of said property within said repeated patterning.

2. (Original) The method according to claim 1, wherein said film is a transparent coating on a semiconductor substrate.

3. (Original) The method according to claim 2, wherein said semiconductor substrate is a die among a plurality of dies carried on a semiconductor wafer.

4. (Currently Amended) The method according to claim 3, wherein said ~~beam of light~~ patterned area is large enough to cover at least one complete die.

5. (Currently Amended) The method according to claim 1, wherein the intensity of ~~the~~ an interference pattern of the light reflected from the upper and lower surfaces of the transparent film is detected for each wavelength.

6. (Original) The method according to claim 1, wherein the intensity of the light reflected from the transparent film is detected by a spectrum analyzer having a photodiode detector-for each wavelength.

7. (Original) The method according to claim 1, wherein the property of the transparent film is measured *in situ* in real time with the application of the transparent film to the substrate; and the property measurement is used to control the application of the transparent film to the substrate.

8. (Original) The method according to claim 1, wherein the transparent film is a photoresist film applied to a semiconductor substrate during the processing of the semiconductor substrate.

9. (Original) The method according to claim 1, wherein the transparent film is an intermetal dielectric layer applied to a semiconductor substrate between two metal layers to dielectrically isolate the two metal layers.

10. (Original) The method according to claim 1, wherein the property of the transparent film is measured *in situ* in real time with the removal of the transparent film from the substrate, and the property measurement is used to control the removal of the transparent film from the substrate.

11. (Original) The method according to claim 8, wherein the property of the transparent film is measured *in situ* in real time with the development of the photoresist, and the property measurement is used to monitor the development rate of the photoresist.

12. (Original) The method according to claim 9, wherein the property of the transparent film is measured *in situ* in real time with the development of the

photoresist, and the property measurement is used to monitor the development rate of the photoresist.

13. (Original) The method according to claim 10, wherein the property of the transparent film is measured *in situ* in real time with the development of the photoresist, and the property measurement is used to monitor the development rate of the photoresist.

14. (Original) The method of claim 1, wherein said wavelengths are selected from the group consisting of infrared wavelengths, visible wavelengths and ultraviolet wavelengths.

15. (Original) The method of claim 1, wherein said decomposing is effected using an orthogonal transformation method.

16. (Original) The method of claim 1, wherein said decomposing is effected using a maximum likelihood method.

17. (Original) The method of claim 1, wherein said decomposing is effected using a method based on a parametric model.

18. (Original) The method of claim 1, wherein said decomposing is effected using a sub-space frequency decomposition method.

19. (Original) The method of claim 1, wherein said decomposing is effected by steps including:

(i) transforming said signal into an electrical signal, and

(ii) filtering said electrical signal.

20. (Original) The method of claim 19, wherein said filtering is effected using a narrow pass filter with a variable central frequency.

21. (Original) The method of claim 19, wherein said filtering is effected using a plurality of narrow pass filters of successively higher central frequencies.

22. (Currently Amended) Apparatus for measuring lateral variations of a property, selected from the group consisting of thickness and refractive index, of a transparent film in a patterned area on a substrate, comprising:

(a) an illuminating device for illuminating the ~~film~~ patterned area over a region comprising repeated patterning with a beam of light of multiple wavelengths, said beam being of such dimension as to encompass said repeated patterning;

(b) a detector for detecting the intensity of the light reflected from the transparent film for each wavelength; and

(c) a processor for:

(i) producing a signal defining the variation of the intensity of the detected light as a function of the wavelength of the detected light,

(ii) decomposing said signal into principal frequencies thereof, and

(iii) determining, from said principal frequencies, values of ~~the lateral variations of~~ the property of the transparent film as said property varies laterally over said repeated patterning and

(iv) applying said values to repetitions of said property within said repeated patterning.

23. (Original) The apparatus according to claim 22, wherein said detector includes a spectrum analyzer for separating the reflected light into its different wavelengths, and a photodiode array including a photodiode detector for each wavelength.

24. (Currently Amended) The apparatus according to claim 22, wherein said ~~semiconductor~~ substrate is a die among a plurality of dies carried on a semiconductor wafer, and said ~~beam of light~~ patterned area is large enough to cover a complete die.

25. (Currently Amended) The apparatus according to claim 22, wherein said detector detects the intensity of ~~the~~ an interference pattern of the light reflected from the upper and lower surfaces of the transparent film for each wavelength.

26. (Original) The apparatus according to claim 22, wherein said apparatus further comprises:

(d) a support for supporting said substrate.

27. (Original) The apparatus according to claim 26, wherein said apparatus further comprises:

(e) a rotary drive for rotating said support while the substrate thereon is illuminated by said illuminating device, and while the intensity of the reflected light is detected by said detector.

28. (Original) The apparatus according to claim 26, wherein said support is a hot plate.

29. (Original) The apparatus as claimed in claim 22, wherein the apparatus further includes a film applicator for applying said transparent film to the substrate, and means for controlling said film applicator in real time in response to the measured thickness of the transparent film.

30. (Currently Amended) The apparatus according to claim 29, wherein said ~~coating~~ film applicator applies a photoresist film on a semiconductor substrate.

31. (Original) The method of claim 22, wherein said wavelengths are selected from the group consisting of infrared wavelengths, visible wavelengths and ultraviolet wavelengths.

32. (Original) The apparatus according to claim 22, wherein said illuminating device includes:

(i) an optical head, and

(ii) a mechanism for moving said optical head to scan the transparent film with said beam of light.

33. (Original) The apparatus according to claim 22, wherein said illuminating device includes a plurality of optical heads at fixed positions relative to the transparent film.

34. (Currently Amended) In a process for fabricating integrated circuits on a wafer, wherein trenches are formed on a surface of the wafer and the surface then is covered with an oxide layer that fills the trenches, a method of measuring depths of the trenches, comprising the steps of:

(a) illuminating at least a portion of the oxide layer with a beam of light of multiple wavelengths;

(b) detecting the intensity of the light reflected from the oxide layer for each wavelength;

(c) producing a signal defining the variation of the intensity of the detected light as a function of the wavelength of the detected light;

(d) decomposing said signal into principal frequencies thereof; ~~and~~

(e) determining from said principal frequencies a first layer depth away from said trenches, and a second layer depth at said trenches, and

(f) deriving from said first and said second layer depths a trench depth.

~~the depths of the trenches from said principal frequencies.~~